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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/621,637	07/17/2003	Yonsheng Shen	011361.00065	2587

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EXAMINER	
OLSEN, KAJ K	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
12/30/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/621,637	SHEN ET AL.	
	Examiner	Art Unit	
	KAJ K. OLSEN	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 September 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-67,70-74 and 76-132* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-67,70-74 and 76-132* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Reissue Applications

1. In accordance with 37 CFR 1.175(b)(1), a supplemental reissue oath/declaration under 37 CFR 1.175(b)(1) must be received before this reissue application can be allowed.

Claims 1-67, 70-74, and 76-132 are rejected as being based upon a defective reissue declaration under 35 U.S.C. 251. See 37 CFR 1.175. The nature of the defect is set forth above.

Receipt of an appropriate supplemental oath/declaration under 37 CFR 1.175(b)(1) will overcome this rejection under 35 U.S.C. 251. An example of acceptable language to be used in the supplemental oath/declaration is as follows:

> "Every error in the patent which was corrected in the present reissue application, and is not covered by a prior oath/declaration submitted in this application, arose without any deceptive intention on the part of the applicant."

See MPEP § 1414.01.

Res Judicata

2. Claims 1, 2, 9-12, 29-34, 52, 54, and 61-64 of this reissue are identical to the claims 1, 2, 9-12, 29-34, 52, 54, and 61-64 presented to the Board of Appeals in Reexamination 90/006,209. The rejection of these claims was affirmed in the Board decision of 3/28/2007. Hence, the claims 1, 2, 9-12, 29-34, 52, 54, and 61-64 are rejected on the grounds of *res judicata* and the applicant is not entitled to further adjudication of the issues concerning these claims.

Specification

3. The examiner has withdrawn the outstanding objection to the specification in view of the amendment of 12/01/2008.

Reissue Applications

4. The outstanding broadening rejection under 35 U.S.C. 251 has been withdrawn in view of the amendment to the claims.

Claim Objections

5. The outstanding objection to claim 128 has been withdrawn in view of the amendment to the claim.

Claim Rejections - 35 USC § 112

6. The examiner has withdrawn the outstanding 35 U.S.C. 112, first paragraph rejection in view of the arguments of 9/15/2009.

7. The examiner has withdrawn the outstanding 35 U.S.C. 112, second paragraph because claim 75 has been cancelled.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various

claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 1, 5, 9, 11-13, 29-34, 52, 53, 57, 61, 63-65, 67, 71, 73, 77, 78, 82, 86, 88-90, 106-113, 117, 121, and 123-127 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey (USP 4,227,984) in view of Uchida (USP 5,474,857), Grot (5,330,860), and/or Vanderborgh et al (USP 4,804,592).

11. With respect to claim 1, Dempsey discloses an electrochemical gas sensor comprising a sensing electrode 13 and a counter electrode 10 both of which are permeable to water vapor and are inherently comprised of electrically conducting material (col. 4, lines 30-64). Dempsey further discloses a first protonic conductive electrolyte membrane 9 permeable to water and situated between and in contact with the sensing and counter electrodes (fig. 2, and col. 4, lines 49-51), and also discloses a means for electrical measurement electrically connecting the sensing and counter electrodes (fig. 3). Dempsey further discloses a means, containing a volume of water (1, 2), for exposing the counter electrode to water vapor (col. 4, lines 39-49). Dempsey does not explicitly disclose the use of sensing and/or counter electrodes having the set forth composition of electron conductive mixed material and proton conducting material, Dempsey did recognize that electrodes set forth in the fuel cell prior art would find utility for the sensor of Dempsey (col. 8, lines 30-63). Uchida teaches a particular electrode for use in fuel cells that comprises a combination of proton conducting material (i.e. Nafion) and carbon and platinum

materials (col. 7, line 55 through col. 8, line 26) that satisfies the claimed percentages (see Reexamination 90/006,209 Request dated 1/29/2002, pp. 4 and 5). Grot also teaches the use of fuel cell electrodes having the claimed compositions (col. 4, line 35 through col. 5, line 2; and col. 14, lines 15-27). Vanderborgh also teaches the incorporation of electrolyte material (polyperfluorosulfonic acid (PFSA)) into the electrode material into the electrode to increase the three phase interface and reduce the electrode resistance. See col. 2, ll. 37-43. Vanderborgh further teaches that such as electrode should includes first and second electrical conductors (C and Pt) that is 82 wt% where the proton conducting material PFSA is 18 wt%. See Table 1 in col. 8. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of any of Uchida, Grot, and/or Vanderborgh for the sensor of Dempsey because these electrodes have shown previous favorable utility in the fuel cell art, and the substitution of one known fuel cell electrode composition for another, when the results are not unexpected, requires only routine skill in the art. Furthermore, the addition of an ionically conductive polymer to the electrodes of Dempsey would improve the electrical properties (e.g. decrease the effective electrode resistance (col. 2, ll. 42 and 43 of Vanderborgh or col. 4, lines 26-29 of Grot). Although Vanderborgh, Uchida and Grot are drawn principally towards fuel cell power sources, both Uchida and Grot recognized the utility of their teachings to include fuel cell sensors like those of Dempsey (see Uchida, col. 10, lines 60-64; and Grot, col. 1, lines 19-30). In addition, Dempsey recognized the utility of teachings from the general fuel cell art for the disclosed sensor (col. 8, lines 30-63).

12. With respect to claim 5, Figure 1 of Dempsey shows opposing surfaces where each surface has a sensing and counter electrode respectively. Moreover, fig. 1 also shows the

working and counter electrodes embedded into the electrolyte membrane resulting in a nonplanar portion of the membrane at the point of the embedding. See fig. 1. This would read on the claimed "substantially nonplanar" membrane giving the claim language its broadest reasonable interpretation.

13. With respect to claims 9 and 11, see Dempsey col. 6, l. 66 - col. 7, l. 16.

14. With respect to claim 12, all of Uchida, Grot, and Vanderborgh taught the use of a combination of carbon and Pt with Pt and C in the claimed ratios. See Uchida, col 7, ll. 59-62; see Grot, col. 14, ll. 15-27; see Vanderborgh, Table 1. Moreover, Vanderborgh explicitly taught the use of carbon black as the preferred source of carbon for the electrodes as it provides a high surface area. See col. 8, ll. 16-28. Hence, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize carbon black as the source of carbon for the electrodes of Uchida and Grot as well as carbon black provides a high surface area support that would maximize the utility of the highly expensive Pt metals.

15. With respect to claim 13, Dempsey describes electrodes formed from noble metals and in particular platinum metals (col. 7, l. 65 - col 8, l. 1) and ruthenium (Ru) is a platinum group metal and a noble metal. Further Grot identifies ruthenium and reduced oxides thereof as a suitable catalytic material that may be used with a carbon black support, such as that sold under the VULCAN trade designation (col. 4, ll. 56-61). One of ordinary skill in the art would have been motivated to form an electrode having the claimed percentages of ruthenium oxide and carbon black as Dempsey describes electrodes formed from noble metals and as Grot and Uchida teach that suitable electrodes for gas sensing applications may be formed having the claimed percentages of noble metals, such as ruthenium oxide, and carbon.

16. With respect to claims 29-34 and the use of the sensor for CO, alcohol, or NOx, see the Dempsey abstract. With respect to the use of the sensor with the gases hydrogen, H2S, and H2O, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. The examiner would note that the applicant gave no other electrode compositions for the detection of hydrogen, H2S or H2O, indicating that the electrodes already set forth for the CO sensor would also be applicable for the other claimed compositions.

17. With respect to claims 52, 57, 61, 63 and 64 (those limitations not covered above) Dempsey also teaches the use of a reference electrode for the sensor (col. 4, lines 60-65) as well as a reservoir 1 containing both water and water vapor which would expose the counter electrode to both water and water vapor (col. 4, ll. 30-34).

18. With respect to claim 65, see the discussion of claim 13 above.

19. With respect to claims 53 and 113, Dempsey teaches a means for applying DC potential across the sensing and counter electrodes. See col. 2, l. 36 - col. 3, l. 38. Although Dempsey does not disclose this DC potential as being for the purpose of transporting gas away from the counter electrode, it would clearly be capable of providing said function.

20. With respect to claim 67 and 73 (those limitations not covered above), because the electrode of Dempsey in view of Uchida, and/or Grot already rendered obvious the combination of catalytic electronic conducting material (e.g. Pt) and ion conducting material (e.g. Nafion) for the electrodes with overlapping composition to the electrodes of the instant invention, then such an electrode would inherently be capable of reacting with a gas in the absence of an applied or biased voltage to the sensing electrode. The fact that Dempsey operates its sensor using an

applied voltage to the sensing electrode does not read free of this limitation because whether or not a voltage is applied is how the sensor is to be utilized and does not further define the structure of the device.

21. With respect to claims 71 and 77 (those limitations not covered above), the sensing and counter electrodes of Dempsey are on opposite sides of the first protonic conductive electrolyte membrane. See fig. 1 and 3.

22. With respect to claims 78, 82, 86, 88-90, and 106-111 (those limitations not covered above), whether or not the sensor is operated at room temperature is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. It is noted however that the sensor of Dempsey can be utilized at room temperature as evidenced by col. 2, ll. 30-35. Furthermore, the means for electrical measurement of Dempsey is capable of detecting a change in electrical characteristic (i.e. current) in response to a positive ambient atmosphere concentration. See col. 11, ll. 8-30.

23. With respect to claims 112, 117, 121, and 123-125 (those limitations not covered above), whether or not the sensor is operated at room temperature is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. It is noted however that the sensor of Dempsey can be utilized at room temperature as evidenced by col. 2, ll. 30-35.

24. With respect to claims 126 and 127 (those limitations not covered above), whether or not the sensor is operated as a residential gas sensor merely constitutes the intended use of the sensor and the intended use need not be given further due consideration in determining patentability.

25. Claims 2, 54, 79, and 114 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey in view of Grot, Uchida, and/or Vanderborgh as applied to claims 1, 52, 78, and 112 above, and further in view of La Conti et al (USP 4,820,386).

26. The references set forth all the limitations of the claims, but did not explicitly recite the presence of antifreeze. La Conti teaches adding materials such as glycols (a well known antifreeze) to the water to increase the effective temperature range for the sensor (col. 11, lines 42-49). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teachings of La Conti for the sensor of Dempsey in view of Grot, Uchida, or Vanderborgh in order to increase the temperature range of the sensor.

27. Claims 3, 55, 80, and 115 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey in view of Grot, Uchida, and/or Vanderborgh as applied to claims 1, 52, 78, and 112 above, and further in view of Hielscher et al (USP 5,403,452).

28. The references set forth all the limitations of the claims, but did not explicitly recite that the surface area of the sensing electrode is smaller than the surface area of the counter electrode. Hielscher teaches in an alternate gas sensor that the counter electrode 2 should be larger than sensing electrode 1 (fig. 4 for example) so that the counter electrode's current density is less than the measuring electrode's current density. See col. 8, ll. 38-44. This is in accordance with the point the examiner made previously from Reexamination 90/006,209 (see p. 19 of the 7/17/2003 Examiner's Answer) in that it was known to make the counter electrode larger than the sensing electrode so that the counter electrode does not diffusion limit the sensor response. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Hielscher and make the sensing electrode smaller than the counter

electrode for the sensor of Dempsey and Uchida, Grot, and/or Vanderborgh in order to ensure that the counter electrode's current density is less than the current density at the working electrode thereby ensuring that the sensing electrode is the diffusion limiting electrode.

29. With respect to the remainder of claims, because the counter electrode of Dempsey is directly exposed to water vapor, the humidity would presumably be at or near 100%. Because the humidity at the counter electrode is greater than the humidity at the sensing electrode, a positive pressure of water vapor would be result.

30. Claims 4, 56, 81, and 116 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey and Hielscher in view of Grot, Uchida, and/or Vanderborgh as applied to claims 3, 55, 80, and 115 above, and further in view of La Conti et al.

31. The reference set forth all the limitations of the claims, but did not explicitly recite the use of a hydrophobic membrane separating the counter electrode from the water vapor. La Conti teaches that the placement of a water transport film between an electrode and a source of water vapor allows impure water sources to be utilized (such as the antifreeze taught above) (col. 11, lines 42-49). The water transport film used by La Conti is a hydrophobic polytetrafluoroethylene (col. 3, lines 62 and 63). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of La Conti for the sensor of Dempsey, Hielscher, and Grot, Uchida, and/or Vanderborgh in order to prevent contamination of the counter electrode.

32. Claims 10, 62, 66, 70, 72, 74, 76, 87, 122, and 128-132 (and claims 67 and 73 in the alternative) are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey in view of

Grot, Uchida, and/or Vanderborgh as applied to claims 1, 52, 78, and 112 above, and further in view of Tomantschger et al (USP 5,302,274).

33. With respect to claims 10, 62, 87, and 122, the references set forth all the limitations of the claims, but did not explicitly recite the use of a hydrated metal oxide protonic conductor electrolyte. Tomantschger teaches in an alternate gas sensor a number of different electrolyte materials useable for gas sensors including a uranyl hydrogen phosphate tetrahydrate (col. 8, lines 37 and 38). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Tomantschger for the sensor of Dempsey in view of Grot, Uchida, and/or Vanderborgh because the substitution of one known electrolyte means for another, when the results are not unexpected, requires only routine skill in the art.

34. With respect to claims 66, 70, 72, 74, and 76 (those limitations not already discussed above), the references do not teach that the sensing and counter electrodes are the only two electrodes in contact with the electrolyte membrane. Rather, Dempsey teaches the presence of an additional reference electrode. However, Tomantschger teaches that it is unnecessary to have three electrodes for the gas sensor as only two are necessary for appropriate sensor operation. In particular, Tomantschger teaches that the gas sensor can comprise only a sensing and counter electrode where the presence of the gas being analyzed is determined based on an induced sensor response. See fig. 8 and 9; col. 9, ll. 1-19; and col. 10, ll. 10-20. Because this configuration of sensor reduces the number of electrodes and reduces the need for an applied potential across the sensor, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the sensor configuration of Tomantschger for the sensor of Dempsey

in view of Uchida, Grot, and/or Vanderborgh in order to simplify the sensor construction and operation.

35. With respect to claims 67 and 73 in the alternative, these claims were rejected earlier because the claim language drawn to operating the sensors in a non-biased manner or without applied voltage did not further define the actual structure of the sensor. However, even if these terms were to be interpreted as structurally further defining the claimed sensor, then these claims would be obvious over the further teaching of Tomantschger for the reasons set forth for claims 66, 70, 72, 74, and 76 above.

36. With respect to new claim 128, Dempsey in view of Grot, Uchida, and/or Vanderborgh set forth all the limitations of the claim (see the discussion of claim 1 above) and further disclosed where each of the sensing and counter electrodes would contain a combination of platinum and carbon (see the discussion of claim 12 above). With respect to the new limitations concerning the use of a copolymer having a tetrafluoroethylene backbone with a side chain of perfluorinated monomers containing a sulfonic acid group, col. 8, ll. 43-49 of the specification evidences that Nafion reads on this defined copolymer and Nafion is the polymer that Grot, Uchida, and Vanderborgh utilized in its electrodes. Moreover, Dempsey taught the use of this solid perfluorinated ion-exchange polymer Nafion as its electrolyte for the sensor. See the discussion above and in the previous office action. Dempsey in view of Grot, Uchida, and/or Vanderborgh did not explicitly recite that the sensing and counter electrodes are the only two electrodes in contact with the first protonic conductive electrolyte membrane. However, Tomantschger teaches that it is unnecessary to have three electrodes for the gas sensor as only two are necessary for appropriate sensor operation. In particular, Tomantschger teaches that the

gas sensor can comprise only a sensing and counter electrode where the presence of the gas being analyzed is determined based on an induced sensor response. See fig. 8 and 9; col. 9, ll. 1-19; and col. 10, ll. 10-20. Because this configuration of sensor reduces the number of electrodes and reduces the need for an applied potential across the sensor, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the sensor configuration of Tomantschger for the sensor of Dempsey in view of Uchida, Grot, and/or Vanderborgh in order to simplify the sensor construction and operation. With respect to the sensor being a residential sensor, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability.

37. With respect to claims 129 and 130, Dempsey utilizes a membrane that is 0.30 mm thick and 16 mm sensing and counter electrodes. See col. 11, ll. 58-67. With respect to the specific use of 15 mm for the sensing and counter electrodes, this is so close to the 16 mm of Dempsey that it constitutes an obvious difference over the area relied on by Dempsey. There is no particular criticality disclosed by the present invention for the specific use of 15 mm, nor is there any criticality to the use of 16 mm by the teaching of Dempsey. With respect to approximately 0.17 mm, finding the optimal thickness requires only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Both the thickness and diameter positions were affirmed in the Appeal decision of 90/006,208.

38. With respect to claim 131, it would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize at least 25% proton conductor material, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*,

105 USPQ 233. Moreover, Grot already teaches that the amount of proton conductor material can already extend up to 25% (col. 4, ll. 3-14).

39. With respect to claim 132, see the discussion for claim 3 above.

40. Claims 66, 70, 72, 74, 76, and 128-132 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey in view of Grot, Uchida, and/or Vanderborgh as applied to claims 1, 52, 78, and 112 above, and further in view of Nagata et al (USP 4,913,792).

41. The references set forth all the limitations of the claims, but did not teach that the sensing and counter electrodes are the only two electrodes in contact with the electrolyte membrane. Rather, Dempsey teaches the presence of an additional reference electrode. Nagata teaches an alternate gas sensor having three electrodes equivalent to the three electrodes of Dempsey (i.e. a sensing (or working) 2, a counter electrode 4, and a reference electrode 3). However, Nagata teaches that the sensor could be constructed without the presence of a reference electrode provided one is willing to utilize a suitably large counter electrode. Nagata further teaches that such a configuration would simplify sensor construction. See col. 7, l. 66 - col. 8, l. 11. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of a two-electrode sensor configuration of Nagata for the sensor of Dempsey in view of Uchida, Grot, and/or Vanderborgh in order to simplify the sensor construction.

42. With respect to claims 128-132, most of the limitations of these claims were already rendered obvious by the teachings of Dempsey in view of Grot, Uchida, or Vanderborgh as discussed in the Tomantschger rejection above (see the preceding rejection). These references did not teach that the sensing and counter electrodes are the only two electrodes in contact with the electrolyte membrane. Rather, Dempsey teaches the presence of an additional reference

electrode. Nagata teaches an alternate gas sensor having three electrodes equivalent to the three electrodes of Dempsey (i.e. a sensing (or working) 2, a counter electrode 4, and a reference electrode 3). However, Nagata teaches that the sensor could be constructed without the presence of a reference electrode provided one is willing to utilize a suitably large counter electrode. Nagata further teaches that such a configuration would simplify sensor construction. See col. 7, l. 66 - col. 8, l. 11. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of a two-electrode sensor configuration of Nagata for the sensor of Dempsey in view of Uchida, Grot, and/or Vanderborgh in order to simplify the sensor construction.

Allowable Subject Matter

43. Pending receipt of an appropriate supplemental reissue declaration, claims 6-8, 14-28, 58-60, 83-85, 91-105, and 118-120 would be objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

44. Similarly, claims 35-51 would be allowed pending an appropriate supplemental reissue declaration.

Response to Arguments

45. Applicant's arguments filed 9/15/2009 have been fully considered but they are only partially persuasive. In particular, the examiner was persuaded by the arguments concerning the

112 first paragraph rejection and has withdrawn those rejections. The remaining arguments were unpersuasive for the reasons discussed in detail below.

46. With respect to the *res judicata* issue, applicant urges that MPEP 1214.01(I) states that *res judicata* only pertains when a final judgment on the merits of the case has been entered by a court having appropriate jurisdiction. However, the examiner believes a final judgment was entered for claims 1, 2, 9-12, 29-34, 52, 54, and 61-64 and these are the claims being rejected over *res judicata*. In particular, MPEP 1214.01 explicitly states "[t]he new grounds of rejection raised by the Board does not reopen prosecution except as to that subject matter to which the new rejection was applied" (emphasis added). Applicant acknowledges this but then asserts that because the grounds of rejection for claims 5, 13, and 57 rely on the same references utilized for claims 1, 2, 9-12, 29-34, 52, 54, and 61-64, applicant is thereby permitted to continue to argue the combination of references that the examiner was already affirmed on. The examiner disagrees as the Board thoroughly dealt with the issues related to the combination of Dempsey with Uchida, Grot, and/or Vanderborgh as they pertained to claims 1, 2, 9-12, 29-34, 52, 54, and 61-64. The Board's new grounds of rejection is drawn solely to the Board's interpretation of "substantially nonplanar" as it pertains to claims 5 and 57, and the Board's interpretation of Ru oxide limitations as they pertain to claim 13. See pp. 44-46 of the 3/28/2007 appeal decision in 90/006,209. The examiner does not believe new arguments about the existing combination of references, especially when there was nothing preventing applicant from making these arguments during the original appeal or during a further appeal of the Board decision, constitutes new evidence to overcome the finding of *res judicata*. Claims 1, 2, 9-12, 29-34, 52, 54, and 61-64 remain rejected under *res judicata*.

47. Applicant further urges that *res judicata* does not automatically apply because the Courts have previously reversed findings of *res judicata* as discussed in MPEP 706.03(w). However, as discussed in previous responses, *res judicata* was typically reversed because one of the examiner, the Board, or other Court had determined that the claims were otherwise free of all rejections except for the *res judicata*. Applicant's cited examples all appear to be drawn to examples like this where the claims are otherwise patentable except for the outstanding *res judicata* rejection. That is not the case here as the claims are still rejected under the same references as were utilized in previous appeal. Moreover, MPEP 706.03(w) documents many cases where the use of *res judicata* was found to be appropriate, particularly when the claims are the same as in the previous decision and the claims remains rejected over the prior art (as is the case here). The examiner's use of *res judicata* here entirely meets the criteria for an appropriate *res judicata* rejection as set forth in MPEP 706.03(w).

48. With respect to the various arguments concerning the continued rejection of the combination of Dempsey in view of Uchida, Grot, and/or Vanderborgh, the examiner is utilizing these references in the same manner as they were in the Examiner's answer of 7/17/2003 in the reexam 90/006,209. The examiner was completely affirmed on issues related to this combination in the decision of 3/28/2007, and it is unclear of the relevance of applicant's continued traversal of the combination of Dempsey with any of Uchida, Vanderborgh, or Grot. The claims are rejected under *res judicata* and it does not appear that further arguments against a combination meet the threshold of new evidence as defined by *In re Herr* and *In re Russell*. However, for the sake of completeness, the examiner will address the crux of these arguments briefly.

49. Applicant's central point appears to be that Dempsey is drawn to a hydrophobic electrode to avoid flooding of the electrode and the incorporation of Nafion, which the applicant maintains is a hygroscopic material, would have been unacceptable for the electrode of Dempsey and hence there would not be any reason one of ordinary skill in the art would have utilized the Nafion of Uchida, Vanderborgh, or Grot for the electrode of Dempsey. First, this inference that Nafion cannot be utilized for a hydrophobic electrode appears to directly contradict both Uchida and Vanderborgh who disclose the utility of Nafion in its electrode, but at the same time disclose that the constructed electrode is either hydrophobic or not prone to flooding. See Uchida col. 2, ll. 50-54 where Uchida disclosed that prior art electrodes constructed of solid polymer electrolytes were unstable due to flooding, and compare with col. 4, ll. 1-11 where a solid polymer electrolyte containing electrode is constructed that presumably wouldn't have this flooding problem that Uchida taught away from (probably due to the water repelling treatment utilized). See Vanderborgh, col. 10, l. 58 – col. 11, l. 1 where the electrode containing the solid polymer electrolyte is hydrophobically treated to control the wetting of the electrode. Hence, two of the three secondary teachings already suggest that the hydrophobic character of the electrodes can still be controlled even though the electrodes contain Nafion. The examiner would further point out that the third teaching of Grot is drawn explicitly to an improvement over an electrode constructed with conductive particles and Teflon (i.e. the same combination relied on by Dempsey) (col. 2, ll. 15-37), suggesting that the use of Nafion instead of Teflon is an obvious modification to one of ordinary skill in the art. This is similarly echoed by Uchida, which also discusses prior Teflon containing electrodes and substituted the use of Nafion instead (col. 2, ll. 6-14). Hence, none of the secondary teachings considered the switch from Teflon to Nafion to

be detrimental to the electrode function. Furthermore, Cisar et al (USP 5,635,039) evidences that Nafion containing electrodes are not inherently plagued with flooding provided one choose the sulfonic group content of the Nafion appropriately (col. 8, ll. 44-65). That is, the hydrophobic or hydrophilic character of the Nafion is going to be a function of the ratio of the hydrophobic perfluorinated polymer backbone to the hydrophilic sulfonic group concentration, and Nafion having higher backbone to sulfonic ratios will be more hydrophobic. Hence, although examples of Nafion being hygroscopic are known in the art doesn't mean that all Nafion is hygroscopic with some Nafion having a high degree of hydrophobic character. This much is echoed by Vanderborgh which states that the wetting properties for ion exchange polymers (like Nafion) are a function of the composition for the polymer (col. 2, ll. 57-61). Hence, applicant's suggestion that one cannot go from the use of Teflon to Nafion without rendering the electrode undesirably hydrophilic is contradicted by essentially all the secondary teachings as well as the new evidentiary teaching of Cisar. Those of ordinary skill in the fuel cell art (where Dempsey derived its electrodes from) were well aware of how to utilize Nafion in an electrode without making the electrode either hydrophilic or necessarily subject to flooding.

50. Applicant's arguments concerning the further teaching of Hielscher appear to substantially mirror the arguments previously made. The examiner addressed these arguments in paragraph 50 of the 2/11/2009 office action.

51. Applicant's arguments concerning the further teaching of LaConti appear to be based on the perceived failings of the earlier rejections. Because these earlier arguments were not persuasive, these further arguments are similarly unpersuasive. Moreover, the examiner's use of

LaConti in a substantially identical to the use of it in the appealed reexamination of which the examiner was affirmed.

52. With respect to the rejection relying on the further teaching of Tomantschger, applicant urges that Dempsey's entire focus is on constructing a three electrode cell and it wouldn't have been obvious to eliminate the reference electrode of Dempsey. This argument entirely ignores that the rejection of these claims was not over Dempsey alone (or more accurately Dempsey in view of any of Uchida, Grot, or Vanderborgh), but Dempsey in view of Tomantschger. Whether or not Dempsey's entire focus is on its three electrode cell does not alter whether one possessing ordinary skill in the art would have recognized that other gas sensor configurations (like the two electrode configurations of Tomantschger) would have been an obvious modification of Dempsey. In particular, Tomantschger teaches that the three electrode embodiment, much like that of Dempsey, is known in the art (fig. 4) and suggested that other sensor embodiments relying on only two electrodes are known as well. One possessing ordinary skill in the art would have recognized that many different sensor embodiments (both two and three electrode embodiments) were known to provide appropriate detection of the desired gas and one possessing ordinary skill in the art would recognize that a sensor of like that of Dempsey could also have been constructed with two electrode embodiments as well.

53. Applicant's arguments concerning Nagata appear to parallel those arguments made for Tomantschger, namely that the reference electrode of Dempsey is so critical to its disclosure that one would not have modified the teaching of Dempsey to not utilize one. Applicant follows this up with the confusion conclusion "Dempsey without a reference electrode is no longer Dempsey" (p. 57 of arguments). The examiner is entirely unclear what that is supposed to mean.

Dempsey without a reference electrode would be much like the sensors disclosed by Tomantschger and Nagata, both of which disclosed that a reference electrode is not critical or even a prerequisite for a gas sensor measurement. More specifically, both Nagata and Tomantschger disclosed both two and three electrode embodiments were known and disclosed going from one to the other. Applicant's whole argument appears to be that because Dempsey gave no indication that one could construct a gas sensor without a reference electrode, it wouldn't have been obvious to not utilize Dempsey without a reference electrode. Hence, applicant is essentially arguing that the threshold for obvious changes to Dempsey is what Dempsey explicitly suggested. However, the threshold for obviousness should not be what did Dempsey explicitly disclose or even suggest, but what would the prior art as a whole suggest to one possessing ordinary skill in the art. Regardless of how much of Dempsey's disclosure is drawn to how it utilized its reference electrode does not alter the fact that one possessing ordinary skill in the art would have recognized that a reference electrode is not necessary for successful gas sensing.

54. Furthermore, the examiner is confused by the applicant continued insistence that one of ordinary skill in the art could not have gone from a three-electrode embodiment like Dempsey to a two-electrode embodiment when applicant's own disclosure shows one can readily do so. In particular, applicant goes from a two-electrode embodiment having just sensing and counter electrodes in fig. 2 to a three-electrode embodiment having sensing, counter, and reference electrodes in fig. 8. There is absolutely no indication in the disclosure that the presence or absence of the reference electrode is critical to the operation of the sensor. The only comment

the applicant appeared to make about this distinction between two and three-electrode sensors is that the two-electrode sensors would have provided a cost savings (col. 13, ll. 52-54).

55. Applicant further urges that Nagata does not teach the use of a sensor "in the absence of an applied voltage to the sensing electrode" because Nagata applies a voltage. This argument ignores the fact that the examiner already indicated that this limitation doesn't further define the actual sensor itself, but only how applicant intends to utilize the set forth structure. Hence, whether or not Nagata utilizes an applied voltage is moot to the question of the claimed structure of the invention.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KAJ K. OLSEN whose telephone number is (571)272-1344. The examiner can normally be reached on M-F 5:30-2:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kaj K Olsen/
Primary Examiner, Art Unit 1795

December 24, 2009